PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 18 May 2001 (18.05.01)	
International application No. PCT/GB00/03603	**Applicant's or agent's file reference** N76945A PEJ
International filing date (day/month/year) 20 September 2000 (20.09.00)	**Priority date** (day/month/year) 20 September 1999 (20.09.99)
Applicant TURBERFIELD, Andrew, Jonathan et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

16 March 2001 (16.03.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Olivia TEFY
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

GB0003603

PATENT COOPERATION TREATY

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From the INTERNATIONAL BUREAU

To:
ELLIS-JONES, Patrick, George,
Armine
J.A. Kemp & Co.
14 South Square
Gray's Inn
London WC1R 5LX
ROYAUME-UNI

J. A. KEMP & CO
REC'D - 9 APR 2001

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

Date of mailing (day/month/year) 29 March 2001 (29.03.01)	
Applicant's or agent's file reference N76945A PEJ	**IMPORTANT NOTICE**

International application No.	**International filing date** (day/month/year)	**Priority date** (day/month/year)
PCT/GB00/03603	20 September 2000 (20.09.00)	20 September 1999 (20.09.99)

Applicant
ISIS INNOVATION LIMITED et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AG,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EA,EE,EP,ES,
   FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,
   MN,MW,MX,MZ,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   29 March 2001 (29.03.01) under No. WO 01/22133

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
N76945A PEJ		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/03603	20/09/2000	20/09/1999
Applicant		
ISIS INNOVATION LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. _____

   [ ] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [X] None of the figures.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Line 8: replace "." with "," after "1000"
Line 8: add "e.g. a glycidyl ether of bisphenol A novolac resin, preferably a SU-8 negative photoresist." after "1000,"

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/03603

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G02B6/12 C08L63/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G02B C08L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
INSPEC, EPO-Internal, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WITZGALL G ET AL: "Single-shot two-photon exposure of commercial photoresist for the production of three-dimensional structures" OPTICS LETTERS, 15 NOV. 1998, USA, vol. 23, no. 22, pages 1745-1747, XP000955303 ISSN: 0146-9592	1-3,8, 10-17, 22,23
Y	page 1745 page 1747, right-hand column	4-7,9

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2000	21/12/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	von Moers, F

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted]B 00/03603

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LEE K Y ET AL: "Micromachining applications of a high resolution ultrathick photoresist" JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B , NOV.-DEC. 1995, USA, vol. 13, no. 6, pages 3012-3016, XP002154618 ISSN: 0734-211X page 3012 ---	4-7,9
X	WO 99 09439 A (DENNING ROBERT GORDON ;TURBERFIELD ANDREW JONATHAN (GB); ISIS INNO) 25 February 1999 (1999-02-25) cited in the application	23
A	page 10, line 15 -page 15, line 30 ---	1,18-21
P,X	CAMPBELL M ET AL: "Fabrication of photonic crystals for the visible spectrum by holographic lithography" NATURE, 2 MARCH 2000, MACMILLAN MAGAZINES, UK, vol. 404, no. 6773, pages 53-56, XP000961267 ISSN: 0028-0836 the whole document -----	1-23

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/03603

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9909439 A	25-02-1999	EP 1005661 A	07-06-2000

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
N76945A PEJ		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/03603	20/09/2000	20/09/1999
International Patent Classification (IPC) or national classification and IPC G02B6/12		
Applicant ISIS INNOVATION LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 11 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

I	☒	Basis of the report
II	☐	Priority
III	☒	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	☐	Lack of unity of invention
V	☒	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
VI	☐	Certain documents cited
VII	☒	Certain defects in the international application
VIII	☒	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16/03/2001	28.01.2002
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Tissot, L Telephone No. +49 89 2399 2586

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03603

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-8 as originally filed

Claims, No.:

1-23 as originally filed

Drawings, sheets:

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 22.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 22 are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-21

	No:	Claims	23
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-21
Industrial applicability (IA)	Yes:	Claims	1-21,23
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Concerning Section III

The wording of claim 22 solely relies on a reference to the whole description, which results in a scope of the claim so unclear (Art. 6 PCT) that no meaningful opinion can be given.
Cf. also, in this respect, the Rule 6.2(a) PCT as well as PCT Guidelines, Chapter III, 4.10, which state that the claims must not rely on references to the description "except where absolutely necessary", which is presently not the case.

Concerning Section V

1. The documents (D) cited in the International search report will be referred to as D1 to D4 in the rest of the examination procedure, the numbering adopted corresponding to the order in which they are cited in this report.

   Furthermore, the following additional document D5 (a photocopy of which is enclosed) is also considered relevant and is therefore introduced into the procedure by the Examiner:

   -D5: Sensors and Actuators A64 (1998), pages 33-39 (cited as reference [5] in D1)

2. The subject-matter of independent method claim 1 does not appear to involve an inventive step (Art. 33(3) PCT).

   D3 (WO 99/09439 A) discloses (cf. in particular the Title and Abstract, as well as claim 1) a method of forming a photonic crystal material comprising exposing a photosensitive material to an interference pattern of electromagnetic radiation whereby the exposure through the material varies in accordance with the spatially varying intensity created by the interference to produce a three dimensional periodic variation in the refractive index of the photosensitive material based on the exposure.

   The subject-matter of claim 1 therefore differs from the above prior art by the sole

fact that the photosensitive material possesses an average number of crosslinkable groups per molecule of at least 3 with an equivalent weight per crosslinkable group of at most 1000.

However, it is already well-known in the art, in order to manufacture three dimensional (3-D) and/or thick structures, to use photosensitive materials such as the ultrathick com-mercial photoresist SU-8 [which SU-8 is described in the present application (cf. page 2, lines 16-22) as being constituted by glycidyl ether of bisphenol A novolac, which has an average of 8 epoxy groups per molecule and an equivalent weight per crosslinkable group of the order of 215].
Cf. in this respect, for instance D1 (Optics Letters, Vol.23, No.22, 1998, pages 1745-47), which discloses the use of SU-8 for manufacturing 3-D structures (cf. the Title and the Abstract, as well as page 1745, right col. beginning of last paragraph), and in particular 3-D photonic crystals (cf. page 1747, right col., eight lines before the end), on a voxel-by-voxel basis by IR two-photon exposure; or D2 (Journal of Vacuum Science and Technology B, Vol.13, No.6, 1995, pages 3012-16), which also discloses the use of SU-8 for manufacturing 3-D structures (cf. the Title and the Abstract, as well as page 3012, left col., Sect. I and II) by UV exposure; or D5, which also discloses the use of SU-8 for manufacturing thick structures by near UV-exposure (cf. in particular the Title and the Abstract, as well the point 2: "SU-8 resist properties and process").

It will therefore appear totally obvious to a skilled person in charge of manufacturing photonic crystals according to the method of D3 to decide to use in said method of D3, as an alternative to the photosensitive materials therein mentioned, the commercial photoresist SU-8 as disclosed in D1 or D2 or D5, which is known to be particularly appropriate to the manufacture of 3-dimensional and/or thick structures, thereby arriving directly at a method corresponding to that of claim 1.

3. Any argumentation aiming to demonstrate that SU-8 as disclosed in D1 or D2 or D5 is not suitable for the formation of holographic photonic crystal structures having uniform 3-D periodicity, because such formation requires precise conditions regarding the transparency, the solubility contrast and the latency of the material which are not met by said SU-8 as disclosed in D1 or D2 or D5, cannot be accepted for the different reasons as follows:

a) Regarding the high transparency required for the material: The transparency of SU-8 as disclosed in D1 or D2 or D5 firstly appears to be already relatively high, contrary to what could be argued. Cf. for instance D5, passage bridging the pages 33 and 34, where it is mentioned that "the key property (of SU-8) ...is its very low optical absorption in the near-UV range". D2 indeed mentions a transmission which is only of 46% at 365 nm, but for a 100 µm thickness, so that the transmission would be much more higher for layers with a thickness of the order of 10 to 30 µm as specified in the present application (cf. for instance page 7, line 26). Moreover, the skilled person in charge of forming a photonic crystal with the SU-8 material as disclosed in D1 or D2 or D5 will easily decide, if observing that the transparency of said material is not high enough at the used wavelength, to increase said transparency up to the right level, either by using a slightly higher wavelength as already taught by D3, page 15, lines 19-22 (it is furthermore very well known to the skilled person that the transparency of photosensisitve materials of the type of SU-8 increases with the wavelength, as shown for instance by the Fig. 1 of D2,), and/or by varying the concentration of the photo-acid generator relative to the epoxy precursor (and/or selecting a slightly different photo-acid generator). It must finally be noted that the photosensitive material as presently specified in claim 1 is not restricted to a predetermined range of transparency, which implies that any photosensitive material can in principle be used in the method of claim 1, provided it possesses an average number of crosslinkable groups per molecule of at least 3 with an equivalent weight per crosslinkable group of at most 1000, which is precisely the case of the SU-8 material as disclosed in D1 or D2 or D5;

b) Regarding the high solubility contrast required for the material, it has to be noted that this property is, as argued by the Applicant and as mentioned in the pre-sent application (cf. page 2, lines 3-6), accentuated by selecting a resin with a very high crosslinking functionnality. This very high crosslinking functionnality is precisely also present in the SU-8 material as disclosed in D1 or D2 or D5, so that the use of such SU-8 material according to D1 or D2 or D8 in the method of D3 will also automatically and unavoidably result in the achieving of said property of high solubility contrast; and

c) Regarding the latency which would be required for the material: It has to be noted that this property is apparently not essential in the present application, contrary to what is argued by the Applicant, since it is described in said application as

being given by the insertion of a photoacid generator (such as a triaryl sulfonium salt) in the material, which insertion of a photoacid grenerator is specified only in dependent claim 10, and not in independent claim 1. This property of latency is anyway also already known from D3, and it is disclosed therein as being also given by the insertion of a photoacid generator in the material (cf. page 14, lines 13-16 and 22-25). SU-8 as disclosed in D2 or D5 moreover also makes use of a photoacid generator such as a triaryl sulfonium salt (cf. Chap. II: "SU-8 properties and process", lines 2-4 as regards D2; or page 34, left col., lines 11-13 as regards D5), so that SU-8 as disclosed in said D2 or D5 has also unavoidably and automatically the desired latency properties.

4. The subject-matter of dependent claims 2 to 21 also does not appear to involve an inventive step.

The features of dependent claims 3 to 9 are also met by the photoresist SU-8 of D1 or D2 or D5.

D3 also discloses all the features of dependent claims 2, 10, 14, 15 and 17 to 21, i.e.,:
-regarding claim 2: cf. claim 2 of D3;
-regarding claims 10, 14 and 15: cf. page 14, lines 12-25;
-regarding claims 17 to 19: cf. page 14, line 26 to page 15, line 14;
-regarding claim 20: cf. page 7, lines 28-32;
-regarding claim 21: cf. for instance page 5, lines 20-24.

The features of dependent claims 11 to 13 and 16 appear trivial to a person skilled in the art of photosensitive materials.

5. The subject-matter of independent product claim 23 does not appear to be novel (Art. 33(2) PCT).

Said claim 23, which is directed to an end-product defined solely by its manufacturing process has, independently of its lack of clarity as indicated in the Section VIII, point 4, thereafter, to be construed as a claim to the end-product as such. This means amongst other things that the features related to the manufacturing

method are limitative only in the extent that they contribute to indirectly define some structural features of the end-product which are difficult to be defined in a direct manner. In other words, said features related to the manufacturing method do not limit the scope of the claimed end-product to the sole end-products as obtained with the specified method; the scope of such claim on the contrary also includes all the end-products obtainable by any other manufacturing method which is able to result in an end-product having the same structural features as those unavoidably resulting from the specified method [one of the consequences of such interpretation being that such claimed end-product is likely to be anticipated by any prior end-product which would present the same stuctural features, even if said prior end-product would have been manufactured by a different method (provided nevertheless that such different method leads to the same structural features for the end-product)].

The end-product as such according to said claim 23 (i.e. as it unavoidably stands, from the structural point of view, once the different steps of the manudfacturing method according to the claims 1 to 21 have been carried out) can as a matter of fact be structurally defined as consisting in a photonic crystal that has a 3-D periodicity in the refractive index, wherein the material which forms said photonic crystal can be any material, not even restricted to the specific photosensitive material as specified in the method of claim 1, since such specific material can, according to the following claim 19, be merely used provisionnally as a template, and then eliminated and replaced by any other material.

However, a number of photonic crystals with a 3-D periodicity in the refractive index are already known, which are made of various materials, so that claim 23 which includes such crystals has to be deemed to be not novel.

6. An amended claim 23, which would have been restricted to photonic crystals made from the specific photosensitive material as specified in the method of claim 1, would have furthermore to be considered as involving no inventive step (Art. 33 (3) PCT), for the same reasons as those given in the above point 2 in relation with method claim 1.

Concerning Section VII

1. Independent claim fails to follow the two-part form (Rule 6.3(b) PCT), which appears appropriate in the present case, and to be correctly delimited with respect to the nearest prior art D3 (cf. the analysis already made in the section V above).

2. The introductory part of the description fails (Rule 5.1(a) (ii) PCT) to aknowledge D1, D2 and D5, with a detailed analysis of their relevant content (cf. the analysis as already made in the Section V above).

Concerning Section VIII

The original set of claims 1 to 21 and 23 does not meet the clarity requirements of Article 6 PCT as regards at least the following points:

1. Claim 1 should have specified that the interference pattern generated in the photosensitive material is a three dimesnsional interference pattern, so to enable to understand how a "spatially" varying intensity can be created by said interference and how a 3-D periodic variation in the refractive index (as specified on lines 4 and 5 of claim 1) can be achieved, as well as to give an antecedent to the expression "the 3-D pattern" in dependent claim 21.

2. Dependent claim 14 should have been appended to claim 10 and following (instead of claim 1 and following as presently), taking into account that the forming of an acid catalysed polymerisation necessitates the presence of an acid generator, as only specified in claim 10.

3. Likewise, dependent claim 17 should have been appended to claim 2 and following (instead of claim 1 and following as presently), taking into account that the development step as well as the voids resuting from such development are only specified in claim 2.

4. Independent claim 23 leaves a strong doubt as to its category in that, whereas it is in principle directed to an end-product (i.e. "a photonic crystal material"), it defines

in fact said end-product solely by its method of manufacturing [cf. the expression "wherever formed by the method as claimed in any one of the preceding claims"], which manufacturing method is furthermore no longer visible on the end-product once it has been completely manufactured.

In a general manner, an end-product (or one of its constitutive elements) as to be defined as mostly as possible by its structural features so as to avoid a lack of clarity (and in particular to remove any doubt as to the category of the claim). The complementary or sole characterisation of an end-product (or one of its constitutive elements) by its process of manufacturing is possibly acceptable solely for clearly defining in an indirect manner those of the structural features which are hardly specifiable as such in an adequate manner, which does not appear to be the case presently (cf. for instance the Section V, point 5, 2nd paragraph, thereabove, showing that the photonic crystal can be entirely defined in term of structural features).

Moreover, when an end-product (or one of its constitutive elements) has to be (at least partly) characterised by its process of manufacture, such characterisation should then take the form "end-product (or element) obtainable by said process" rather than "end-product (or element) formed by said process" as specified presently, in order to remove any doubt as to the category of the claim.

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